The Oil Drum: Europe
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

The 2008 IEA WEO - Production Decline Rates

Posted by Euan Mearns on November 17, 2008 - 3:06pm in The Oil Drum: Europe
Topic: Policy/Politics
Tags: cera, decline rate, iea, original, weo 2008 [list all tags]

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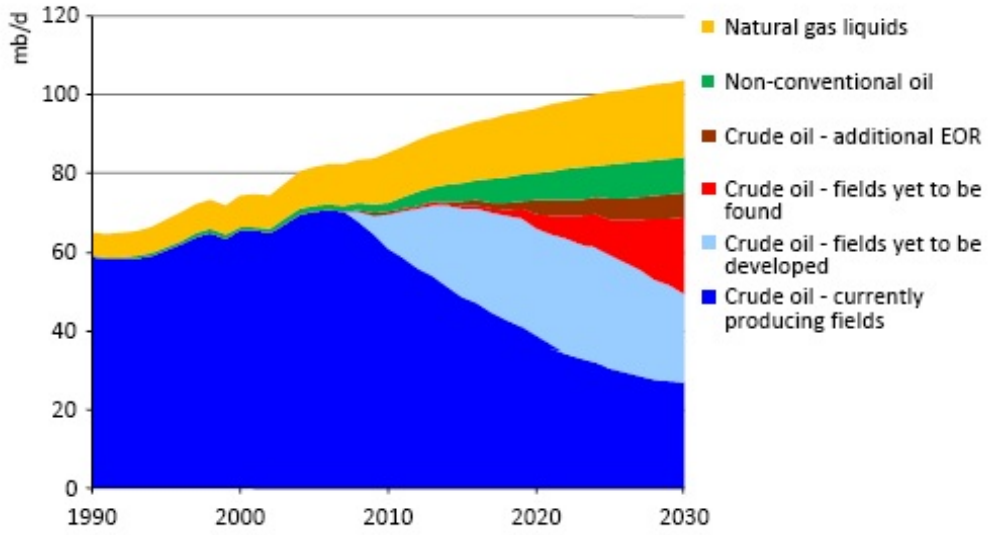


*This chart is from a section of the IEA publications called **key graphs** and appears in Chapter 11, p250 as Figure 11.1.*

Chapter 10, p 243 of IEA WEO 2008 says this:

> On this basis, we estimate that the average observed decline rate worldwide is 6.7%. Were that rate applied to 2007 crude oil production the annual loss of output would be 4.7mmbpd.

So it seems reasonable to expect the decline rate on currently producing fields shown above should be 6.7%. Not so. The decline rate in the chart above seems to be much closer to 4%. So what's going on here? There's more below the fold.

Chapter 10 of IEA WEO 2008 provides a detailed overview of oil field decline rates based on 798 oil fields, but mainly based upon the IHS data base. It is written by an industry expert and provides much insight as to how decline varies between different classes of oil field. However, when you are working on forecasting global fossil fuel supplies, in the first instance you really want to know just one number. Namely, what is the decline rate that should be applied to current producing fields? Sadly, amongst all the complex detail this vital statistic seems to be missing. Worse than that, several conflicting and ambiguous statements are made. **The press** reported

before IEA WEO 2008 was released, that global decline rates were higher than previously believed, priming readers for a sensational surprise.

The views of many on oil field decline rates are formed by the **CERA** private report published last year called: **Finding the Critical Numbers**. I had a long chat with Peter Jackson (report author) last year about this report where the key findings were related to me. In simple terms, CERA divide global production into three main components:

1. Fields in build up phase
2. Fields on production plateau
3. Fields in decline phase

What CERA found was that only 41% of production comes from fields in the decline phase, the remaining 59% from fields in build up and on plateau. A significant proportion of plateau production comes from OPEC super giants. In the decline phase, rates vary from 6% for onshore fields to 18% for deep water offshore fields. CERA concluded that the aggregate global decline rate was 4.5% - and this is the magic number we are looking for in IEA WEO 2008.

Conflicting statements

Here are some of the summary statements made in IEA WEO 2008 on decline rates:

Executive summary, page 43:

> We estimate that the average production-weighted observed decline rate worldwide is currently 6.7% for fields that have passed their production peak. In our Reference Scenario, this rate increases to 8.6% in 2030.

This statement clearly applies to post-peak fields, which following the IEA terminology includes fields on plateau (like Ghawar) and those in decline. But what about fields in build up?

Chapter 10, page 243

> On this basis, we estimate that the average observed decline rate worldwide is 6.7%. Were this rate to be applied to 2007 crude oil production, the annual loss of output would be 4.7 mb/d.

This statement is more ambiguous, applying 6.7% to the whole stack of current production.

And then in Chapter 11, page 255 we have this:

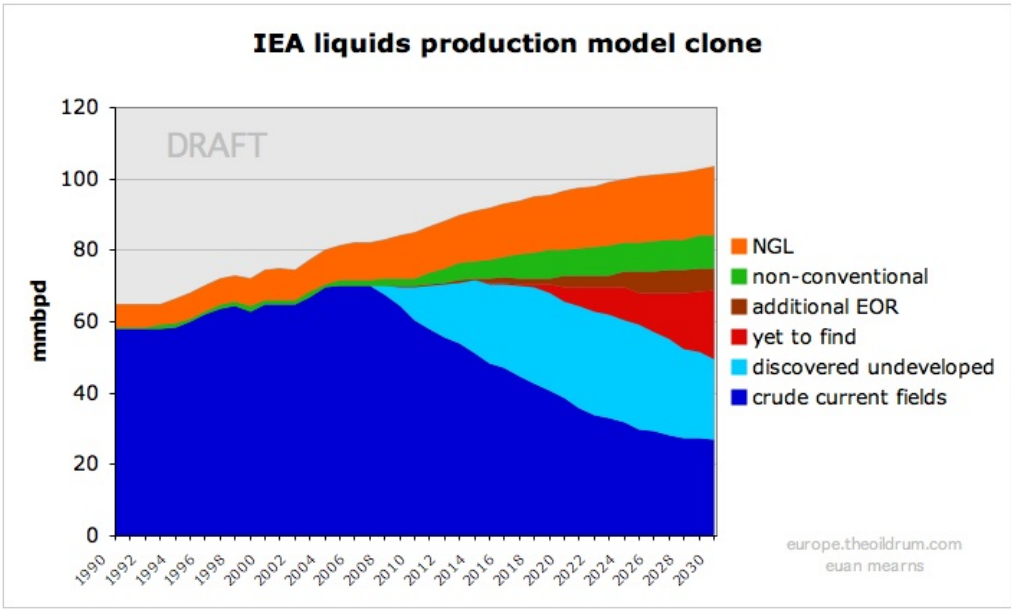
> The overall average annual fall in output at existing fields is proportionately much smaller in OPEC countries, at 3.3%, than in non-OPEC countries, where it is 4.7%, reflecting the fact that most OPEC fields are onshore.

Surprisingly, and very frustratingly the average for OPEC and non-OPEC "average annual fall" is not given. However, weighting these figures for 2007 production (OPEC = 31.1 mmbpd and non-OPEC = 39.1 mmbpd, Table 11.1 page 251) gives an aggregate "average annual fall" = 4.08%. Is

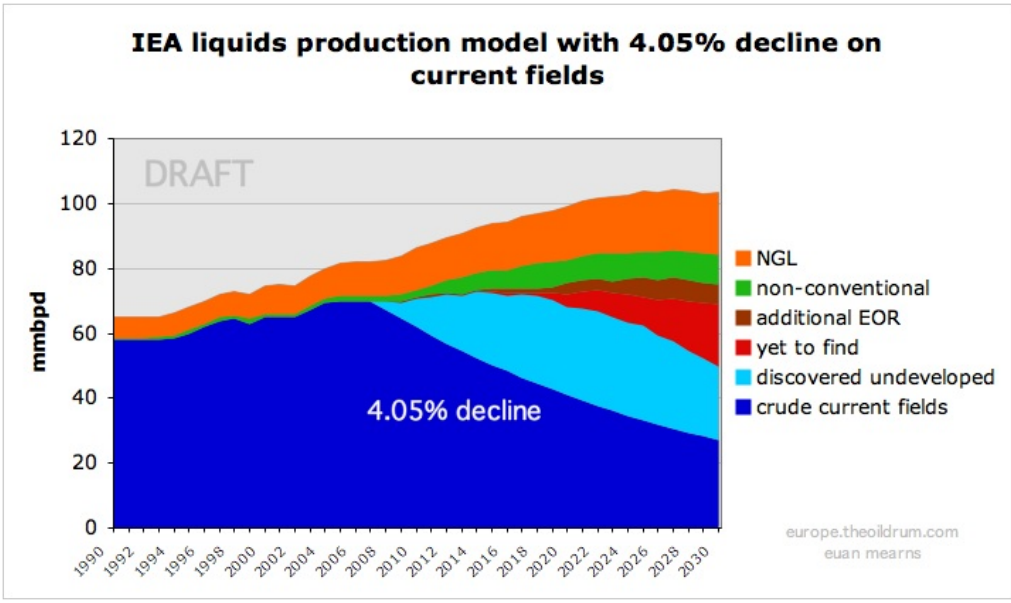
this the magic number we are looking for? If it is then it is lower and not higher than the CERA figure.

Chart analysis

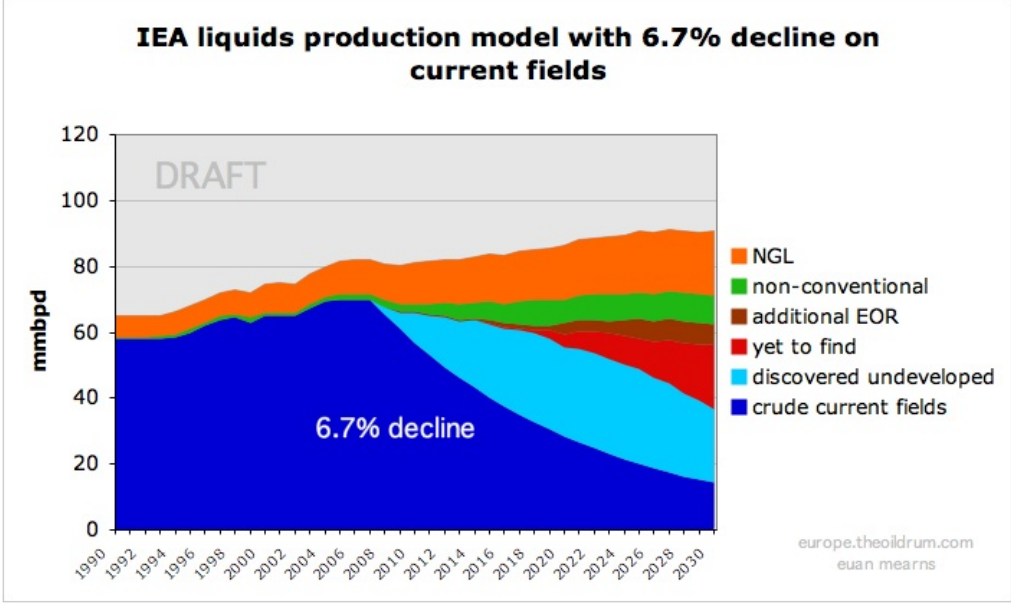
Using Mac OSX Preview grab, we inserted the IEA production model into an XL chart, extracted the data by hand from which this clone is made.



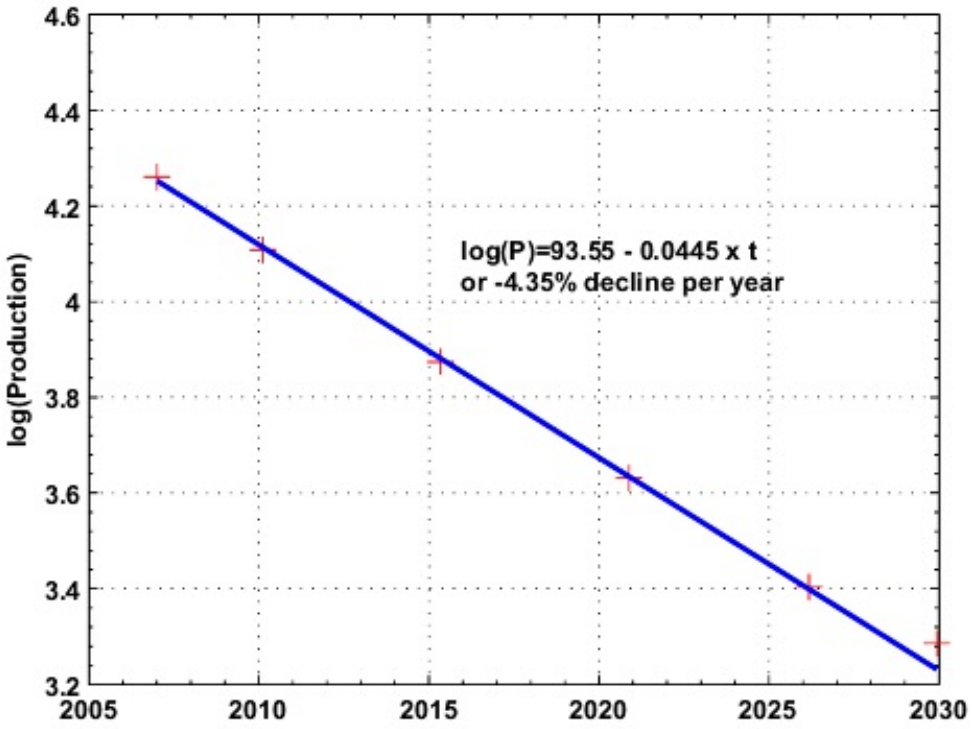
Exponential decline rates were then variably applied to the "current producing" stack to try and replicate the IEA chart. It was not possible to get a perfect fit, but the best approximation was for an exponential decline rate of 4.05%, which is essentially the same as the 4.08% figure discussed above.



Using a decline rate of 6.7% provides a much more sobering picture of future liquid fuel supplies, especially considering that the natural gas liquid, discovered undeveloped and yet to find components all appear to be rather optimistic.



A least squares fit of the IEA decline data extracted from their chart suggests that a decline rate value of 4.35% may in fact have been used. In which case their analysis has reached the exact same conclusion as CERA.



Conclusion

The IEA are to be applauded for conducting and reporting a detailed analysis of global oil field decline rates. This is truly vital data for understanding and predicting the future course of global energy supplies upon which the future of Mankind is based. No doubt the mainstream media, international policy makers and politicians will be suitably impressed by the rigor and detail contained in this report, that they do not understand.

As far as we can establish, the IEA analysis shows that global decline rates are actually lower or

the same as those reported by CERA last year. We have sent two emails to Dr Birol requesting clarification on the points raised in this report and are awaiting his reply.

The key information required is this:

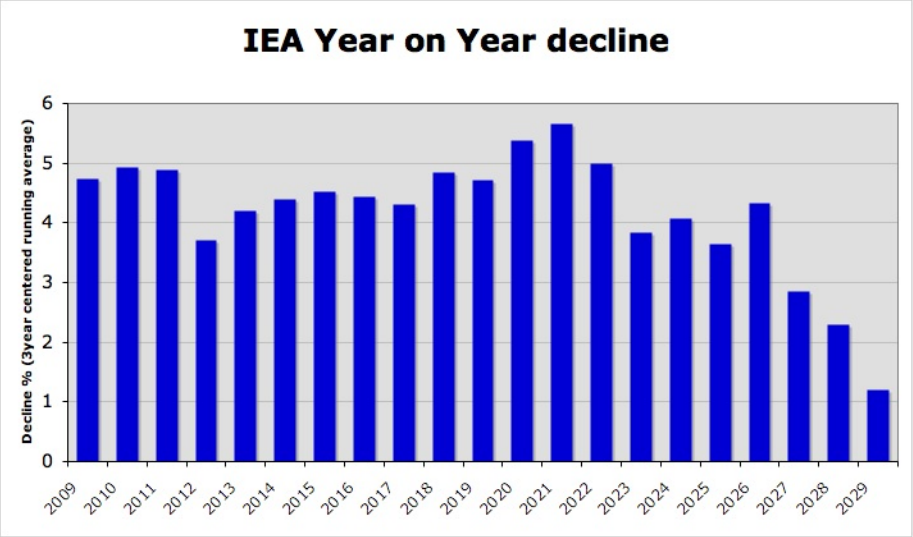
What % of current production comes from fields in production build up phase and what decline rate (presumably negative decline) is applicable to that production increment?

What % of current production comes from fields in the post peak / plateau / decline phase and what is the weighted average decline rate applicable to that production increment?

How have these variables evolved in the past, and how are they set to evolve in future?

[Editor's note added around midday, Monday GMT]

Full credit to GaryP who in **this comment** spotted this:



On page 221, the IEA says this:

> Our reference scenario projections imply a one percentage-point increase in the global avearge natural decline rate to over 10% per year by 2030 as all regions experience a drop in average fields size and most see a shift in production to offshore fields.

Note that natural decline is the decline rate without field investments and most of this discussion here has centered upon observed decline rates which include field investments and are therefore lower than the natural decline figure. But the point is the IEA are forecasting decline to increase by 1% point forward to 2030, whilst their chart has a very substantial drop in decline rate, within currently producing oil fields, embedded in it. This is why it was not possible to replicate their chart using a single decline figure.